

CRITICAL NOTES ON THE SUBSPECIES OF THE SPOTTED OWL, *STRIX OCCIDENTALIS* (XANTUS).

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The four current subspecies of *Strix occidentalis*, with the geographical range apportioned to each, are as follows:

STRIX OCCIDENTALIS OCCIDENTALIS (Xantus).

Syrnium occidentale XANTUS, Proc. Acad. Nat. Sci. Phila., 1859, p. 193 (Fort Tejon, California).

Southern California and northern Lower California.

STRIX OCCIDENTALIS CAURINA (Merriam).

Syrnium occidentale caurinum MERRIAM, Auk, vol. 15, January, 1898, p. 40 (Mount Vernon, Skagit Valley, Washington).

Southern British Columbia, south through western Washington and western Oregon to central California.

STRIX OCCIDENTALIS HUACHUCAE Swarth.

Strix occidentalis huachucae SWARTH, Univ. Calif. Publ. Zool., vol. 7, No. 1, May 26, 1910, p. 3 (Huachuca Mountains, Arizona).

Arizona, New Mexico, Colorado, and central western Texas.

STRIX OCCIDENTALIS LUCIDA (Nelson).

Syrnium occidentale lucidum NELSON, Proc. Biol. Soc. Wash., vol. 16, November 30, 1903, p. 152 (Mount Tancitaro, Michoacan, Mexico).

States of Guanajuato and Michoacan, Mexico.

Each of these forms was originally described from a single specimen, and the species is still uncommon in museums. Recent collecting for the United States Biological Survey has resulted in the acquisition of eight adult specimens of *Strix occidentalis huachucae*, all in fine adult autumn plumage, six of them from New Mexico, the others from Arizona. The types of *Strix occidentalis caurina* and *Strix occidentalis lucida* are also in the Biological Survey collection; while in addition the United States National Museum possesses the type of *Strix occidentalis occidentalis* and another California specimen; one adult *Strix occidentalis lucida* from Guanajuato, Mexico; and a practically topotypical example of *Strix occidentalis huachucae*. Through the kindness

of Dr. Joseph Grinnell I have been able to examine the type of *Strix occidentalis huachucae*; and Dr. Louis B. Bishop has obligingly sent two specimens from New Mexico, together with three from Arizona, and two of *Strix occidentalis occidentalis* from California. Through Mr. H. S. Swarth it has been made possible to borrow nine more specimens of *Strix occidentalis occidentalis* from California, which he had brought together for a further study of his *Strix occidentalis huachucae*. He, furthermore, very courteously offered the writer the use of his manuscript notes made with the view of publishing a supplementary account. The above material, altogether 31 specimens, including 2 in juvenal plumage, constitutes by considerable the largest series of birds of this species that has ever been available at one time. A careful study of these for the purpose of identifying specimens in the collection of the Biological Survey, compels some surprising as well as interesting conclusions, which seem worthy of printed record.

The eight adult examples from New Mexico, together with the six from southern Arizona, represent what should be typical *Strix occidentalis huachucae*. This race, quoting the original description,¹ differs from *Strix occidentalis occidentalis* as follows:

"Similar to *Strix occidentalis occidentalis* (Xantus), but slightly smaller, and conspicuously paler; white markings more extensive and dark areas less deep toned."

An exhaustive comparison of this series of 14 adults from New Mexico and Arizona with typical *Strix occidentalis occidentalis* shows that all but one of the characters given to separate *Strix occidentalis huachucae* are merely individual. The difference of size is inconsiderable and inconsequential, as the appended measurements demonstrate; while the supposedly most important distinction, that of the lighter tone of the dark areas, appears in but five of the fourteen specimens, and many of the others are even darker than normal *Strix occidentalis occidentalis*! A single bird from Tucson, Arizona (No. 84433, U.S.N.M.), is the palest of the present series, being, in its light rufescent brown coloration, very much like the type of *Strix occidentalis huachucae*, but even lighter and more rufescent, with more tinge of ochraceous on the face and lower parts. A specimen from the Santa Rita Mountains (No. 241139, U.S.N.M.), some 30 or 40 miles south of Tucson is, however, as dark as the type of *Strix occidentalis caurina*, the supposedly darkest form of the species. Other examples from New Mexico are even darker. Thus, light rufescent birds like the Tucson specimen above mentioned, together with others nearly as light in ground color, from New Mexico and Arizona, are found geographically intermingled with dark birds, and must be considered, therefore, merely as representing a color phase. There is, likewise, nothing but individual variation in the

¹ Swarth, Univ. Calif. Publ. Zool., vol. 7, No. 1, May 26, 1910, p. 3.

amount of dark mottling on the legs and feet of these specimens, so that this can not be a racial characteristic. The only characters, so far as we can discover, which will distinguish *Strix occidentalis huachucae* from *Strix occidentalis occidentalis* are the larger white markings on scapulars, cervix, superior wing-coverts, and posterior lower parts; together with the paler, often whitish bars on wing-quills and tail-feathers. This increase of white is most conspicuous and most nearly constant on the scapulars, only average on the other parts; but taken altogether, seems sufficient for the recognition of the Arizona race as distinguished from that of California.

Another subspecies described as *Syrnium occidentale lucidum* from Mount Tancitaro, Michoacan, Mexico, by Mr. E. W. Nelson,¹ was diagnosed as follows:

"Darker and with much less yellowish buffy suffusion throughout than in *S. occidentale*; white markings larger and clearer white."

The type is identical in all respects with a specimen from Taylor Creek, Socorro County, New Mexico, except for being not quite so dark above as the latter. As a matter of fact, most of the birds in the New Mexico and Arizona series are fully as dark as the type of *Strix occidentalis lucida*, several of them even more deeply colored. Another Mexican example, from Guanajuato, is the same as *Strix occidentalis lucida* from Michoacan, though somewhat lighter than the type, with almost immaculate white legs and feet and more restricted white markings on the upper surface. From others of the Arizona and New Mexico series it can not be distinguished. Since, furthermore, all the characters valid for the separation of *Strix occidentalis lucida* from *Strix occidentalis occidentalis* are the same as those distinguishing *Strix occidentalis huachucae* from *Strix occidentalis occidentalis*, it follows that *Strix occidentalis lucida* and *Strix occidentalis huachucae* are identical. Thus the name of the Arizona race becomes *Strix occidentalis lucida* Nelson,¹ because this name has several years priority over *Strix occidentalis huachucae* Swarth.²

The above comparisons necessarily involved an examination of *Strix occidentalis caurina*, from Mount Vernon, Washington. This was originally described³ as differing from *Strix occidentalis occidentalis* principally by reason of darker general coloration and reduced white markings. The before-mentioned specimens from California prove beyond reasonable doubt that *Strix occidentalis caurina* is a synonym of *Strix occidentalis occidentalis*, for all its peculiarities are to be found among these California birds. Many of the specimens of *Strix occidentalis lucida* from Arizona and New Mexico are fully as dark above as is *Strix occidentalis caurina*, and some are even darker; several are as dark below, with nearly the same amount of ochraceous suffusion

¹ Proc. Biol. Soc. Wash., vol. 16, November 30, 1903, p. 152.

² Univ. Calif. Publ. Zool., vol. 7, No. 1, May 26, 1910, p. 3.

³ Merriam, Auk, vol. 15, 1898, p. 40.

posteriorly, and with practically an equal amount of mottling on the legs and feet. In the reduction of light markings on the upper surface the type of *Strix occidentalis caurina* may be closely matched in all respects by some of the California birds, as well as by the type of *Strix occidentalis occidentalis*. Moreover, the type of *Strix occidentalis occidentalis* is an old, formerly mounted specimen, and is considerably faded and apparently otherwise discolored. Another southern California example (No. 1392, collection of G. Willett) is actually identical with the type of *Strix occidentalis caurina*, except for being darker. There is thus no distinctive character left for the recognition of *Strix occidentalis caurina* as a subspecies.

From what has already been said it is evident that there are but two forms of *Strix occidentalis*, instead of four, although both have a relatively wide geographical range. The only characters that now appear to be of value for the separation of these geographical races are in the size and distinctness of the white markings on the feathers, principally of the upper parts, though also below, but there is great variation even in this respect in the series of specimens examined.

The following millimeter averages of birds from various regions throughout the range of the species, show clearly of how little sub-specific value is any difference of size:

Localities.	Wing.	Tail.	Exposed culmen.	Culmen from cere.	Tarsus.
Four males (<i>Strix occidentalis occidentalis</i>), from California.....	mm. 309.8	mm. 202	mm. 30.9	mm. 20.9	mm. 52.5
Seven males (<i>Strix occidentalis lucida</i>), from Arizona and New Mexico.....	307.1	199.9	29.8	20.3	53.1
Six females (<i>Strix occidentalis occidentalis</i>), from California.....	310.8	206.1	31.8	22.2	53.6
One female (<i>Strix occidentalis occidentalis</i>), from Washington.....	304	198	31.5	21.3	54
Six females (<i>Strix occidentalis lucida</i>), from Arizona and New Mexico.....	312.7	206.1	31	21.3	53.4
Two females (<i>Strix occidentalis lucida</i>), from central Mexico.....	311	203	30.6	21.7	54

This reduction of the four described and currently recognized subspecies of *Strix occidentalis* to two closely allied forms is a surprising conclusion, in view of the wide geographical range of the species—from central Mexico to southern British Columbia—and also of the well-known tendency of owls in general to form numerous geographical races, but it is inevitable from an examination of the material now available. The only other course possible is to reduce them to a single form. The present result is, however, nearly paralleled by the unexpected, but none the less apparently correct conclusion by Mr. Robert Ridgway¹ concerning the lack of any recognizable subspecies in *Otus flammeolus*. It shows, too, that geographic or physiographic analogy, though of considerable assistance in working out geographical races, is an unsafe guide alone.

¹ Bull. U. S. Nat. Mus., No. 50, pt. vi, April 8, 1914, pp. 728-730.

Our investigation has resulted, furthermore, in the interesting discovery that there are two well-marked color phases in *Strix occidentalis*, the lighter of which is of comparatively rare occurrence. One of these phases is characterized above by a deep clove brown ground color, below by markings of similar color, and is represented by many of the specimens in the Arizona-New Mexico series, as well as by the types of *Syrnium occidentale caurinum* Merriam and *Syrnium occidentale lucidum* Nelson. The other phase is rather light rufescent brown above, with similar markings below, and is exemplified by the specimen from Tucson (No. 84433, U.S.N.M.). Between these two phases there are various intermediates, represented in our series by the types of *Strix occidentalis occidentalis* and *Strix occidentalis huachucae*; several further examples from Arizona and New Mexico, and a specimen from Pasadena, California (No. 135190, U.S.N.M.).

Another point, which the measurements bring out, and which seems worthy of notice, is that the female in this species is but little larger than the male, showing much less difference in this respect than is usual among owls.

In view of the above conclusions, the races of this species will now stand as follows:

STRIX OCCIDENTALIS OCCIDENTALIS (Xantus).

Syrnium occidentale XANTUS, Proc. Acad. Nat. Sci. Phila., 1859, p. 193.

Syrnium occidentale caurinum MERRIAM, Auk, vol. 15, January, 1898, p. 40.

Type-locality.—Fort Tejon, California.

Geographical distribution.—Pacific coast region of the United States, in Washington, Oregon, and California; also north to southern British Columbia; south to northern Lower California; and east to eastern California.

Measurements.¹—Male: Total length (in flesh), 436.9 mm.;² extent of wing, 763.²

Female: Total length (in flesh), 431.8–489 (average, 463.6) mm.;³ extent of wing, 1041.4.²

Male:⁴ Wing, 301–322 (average, 309.8) mm.; tail, 200–204 (202); exposed culmen, 29.3–32 (30.9); culmen from cere, 20.5–21.2 (20.9); tarsus, 51–54.5 (52.5).

Female:⁵ Wing, 304–315 (average, 309.9) mm.; tail, 193–213 (204.9); exposed culmen, 30–33 (31.7); culmen from cere, 20–23.8 (22); tarsus, 53–54 (53.7).

¹ Measurements in this paper are in millimeters, and have been taken as explained in the writer's article on *Butorides virescens* (Proc. U. S. Nat. Mus., vol. 42, August 29, 1912, p. 533), except for "culmen from cere," which is the chord of the culmen taken from the tip of the maxilla to the anterior edge of the cere.

² One specimen.

³ Three specimens.

⁴ Four specimens, from California.

⁵ Seven specimens, from California and Washington.

Detailed measurements of the specimens of this race examined are as follows:

Measurements of specimens of Strix occidentalis occidentalis.

Museum and No.	Sex.	Locality.	Date.	Collector.	Wing.	Tail.	Exposed culmen.	Culmen from cere.	Tarsus.
L.B.Bishop 26195 ¹	Male....	Near Monrovia (alt., 2,500 ft.), Los Angeles Co., Cal.	Nov. 3, 1913	G. Willett...	mm 311	mm 204	mm 31	mm 21.2	mm 51.5
G. Willett 1392 ¹	do.....	do.....	Nov. 9, 1913	do.....	305	201	32	20.5	53
U.S.N.M. 17200 ¹	do.....	Fort Tejon, Cal. ²	Nov. 1, 1894	J. Xantus...	322	203	31.3	21	51
U.S.N.M. 135190 ¹	do.....	Pasadena, Cal.	Nov. 1, 1894	W. B. Judson.	301	200	29.3	21	54.5
G. Willett 830 ¹ ...	Female.	Fillmore, Ventura Co., Cal.	Dec. 13, 1910	A. N. Stone.	305	193	31.3	22	54
L.B.Bishop 26196 ¹	do.....	do.....	do.....	do.....	315	203	32.8	22.5	53
C. H. Richardson jr. 495. ¹	do.....	Wilson Peak Trall, Los Angeles Co., Cal.	Mar. 21, 1905	C. H. Richardson, jr.	309	211.5	33	20	54
G. Willett 1393 ¹ ...	do.....	Near Monrovia (alt., 2,500 ft.), Los Angeles Co., Cal.	Nov. 3, 1913	G. Willett...	315	208	31.8	23.8	53
L. H. Miller— ¹ ...	do.....	Castac Creek, Los Angeles Co., Cal.	Apr. 10, 1911	L. H. Miller.	310	213	...	...	...
F. S. Daggett 4526 ¹	do.....	San Dimas Canyon, Pomona, Cal.	Feb. 14, 1903	F. S. Daggett.	311	208	30	22.5	54
U.S.N.M. 157473 ¹ ...	do.....	Mount Vernon, Wash. ³	June 22, 1897	E. A. Preble.	304	198	31.5	21.3	54
L. H. Miller —...	Female, juvenal.	Forest Home, Cal....	Aug. 17, 1913	L. H. Miller.	...	...	...	...	...
Mus. Hist. Sci. Art —.	do.....	Hills west of Newhall, Los Angeles Co., Cal.	May 20, 1906	H. J. Lande.	310	203	31.3	20.5	53
G. Willett 1395.....	do.....	Near Monrovia (alt., 2,500 ft.), Los Angeles Co., Cal.	Nov. 3, 1913	G. Willett...	314	211	31	23	51.5

¹ Used in measurement averages on p. 255.

² Type of *Syrnium occidentale* Xantus.

³ Type of *Syrnium occidentale caurinum* Merriam.

STRIX OCCIDENTALIS LUCIDA Nelson.

Syrnium occidentale lucidum NELSON, Proc. Biol. Soc. Wash., vol. 16, November 30, 1903, p. 152.

Strix occidentalis huachucae SWARTH, Univ. Calif. Publ. Zool., vol. 7, No. 1, May 26, 1910, p. 3.

Type-locality.—Mount Tancitaro, Michoacan, Mexico.

Geographical distribution.—Southwestern United States and northern and central Mexico; north to Colorado; west to Arizona; south to Michoacan and Guanajuato; and east to western Texas, eastern New Mexico, and central Colorado.

Chars. subsp.—Similar to *Strix occidentalis occidentalis*, but white markings on scapulars, upper wing-coverts, cervix, and posterior lower parts larger; light bars on remiges and rectrices more whitish.

Measurements.—Male: Total length (in flesh), 419.1–444.5 (average, 434.3) mm.;⁴ extent of wing, 1054.1–1073.2 (1065.3).⁵

Female: Total length (in flesh), 419.1–457.2 (average, 441.5) mm.;⁵ extent of wing, 1041.4–1098.3 (1073.2).⁵

⁴ Five specimens.

⁵ Four specimens.

Male:¹ Wing, 302–309 (average, 307.1) mm.; tail, 191–206 (199.9); exposed culmen, 27–32 (29.8); culmen from cere, 18.6–21.5 (20.3); tarsus, 52–54 (53.1).

Female:² Wing, 302–320 (average, 312.3) mm.; tail, 196–212.5 (205.3); exposed culmen, 29–33 (30.9); culmen from cere, 19.5–23 (21.4); tarsus, 51.5–55.5 (53.6).

Detailed measurements are added in the following table:

Measurements of specimens of Strix occidentalis lucida.

Museum and No.	Sex.	Locality.	Date.	Collector.	Wing.	Tail.	Exposed culmen.	Culmen from cere.	Tarsus.
H. S. Swarth 3691 ³ . U. S. N. M. 241139 ³ .	Male....	Huachuca Mts., Ariz. ⁴ Stone Cabin Canyon (alt., 7,000 ft.), Santa Rita Mts., Ariz.	Apr. 11, 1903 Oct. 28, 1913	H. S. Swarth V. Bailey...	mm. 308 309	mm. 193 205	mm. 29.5 29	mm. 20 20	mm. 53 53
L. B. Bishop 16876 ⁵ .	do.....	Santa Catalina Mts., Ariz.	July 7, 1906	H. Kimball.	302	191	32	21.5	53.5
L. B. Bishop 26164 ⁵ .	do.....	Kelly Canyon (alt., 6,500 ft.), western side of San Mateo Mts., Socorro Co., N. Mex.	Mar. 23, 1914	J. S. Ligon..	307	201	27	20.5	53.5
U. S. N. M. 241186 ³ .	do.....	Head of Chloride Creek (alt., 8,000 ft.), 12 miles west of Chloride, Sierra Co., N. Mex.	Dec. 20, 1913	.....do.....	309	201	30	18.6	53
U. S. N. M. 241183 ³ .	do.....	6 miles west of Chloride (alt., 6,500 ft.), Sierra Co., N. Mex.	Oct. 22, 1913	.....do.....	309	206	31	21	54
U. S. N. M. 240762 ³ .	do.....	15 miles northeast of Monticello (alt., 7,000 ft.), San Mateo Mts., So- corro Co., N. Mex.	Oct. 1, 1913	.....do.....	306	202	30	20.5	52
L. B. Bishop 16878	Male, ju- venal.	Santa Catalina Mts., Ariz.	July 7, 1906	H. Kimball.	.....	.....	.....	.....	.....
U. S. N. M. 241184 ³ .	Female.	3 miles north of Eagle Peak (alt., 8,000 ft.), Tularosa Range, Socorro Co., N. Mex.	Dec. 5, 1913	J. S. Ligon..	315	206	31.3	20.5	54.5
U. S. N. M. 241185 ¹ .	do.....	Head of Chloride Creek (alt., 8,000 ft.), 12 miles west of Chloride, Sierra Co., N. Mex.	Dec. 20, 1913	.....do.....	309	208	30.8	21.8	52.5
U. S. N. M. 241138 ³ .	do.....	Taylor Creek (alt., 7,000 ft.), 30 miles west of Chloride, Socorro Co., N. Mex.	Nov. 3, 1913	.....do.....	308	205	29	21.8	51.5
L. B. Bishop 26165 ⁵ .	do.....	Bear Canyon (alt., 7,000 ft.), 12 miles northwest of Fair- view, Sierra Co., N. Mex.	Mar. 7, 1914	.....do.....	320	212.5	32	21	53.5
U. S. N. M. 84433 ³ .	do.....	Tucson, Ariz.....	Nov. 7, 1872	C. E. Ben- dire.	304	205	30	19.5	53
L. B. Bishop 16877 ⁵ .	do.....	Santa Catalina Mts., Ariz.	July 7, 1906	H. Kimball.	320	200	33	23	55.5
U. S. N. M. 185269 ³ .	do.....	Mount Tancitaro, Michoacan, Mex. ⁶	Feb. 27, 1903	E. W. Nel- son and E. A. Gold- man.	320	210	31	22.5	55
U. S. N. M. 81925 ³ .	do.....	Guanajuato, Guana- juato, Mex.	.....	A. Dugés....	302	196	30.2	20.8	53
U. S. N. M. 241187....	do.....	Blue, Ariz.....	May —, 1914	B. V. Lilly..	321	212	31.5	22	54.5

¹ Seven specimens, from Arizona and New Mexico.

² Eight specimens, from Arizona, New Mexico, Michoacan, and Guanajuato.

³ Used in measurement averages on p. 257.

⁴ Type of *Strix occidentalis huachucae* Swarth.

⁵ Type of *Syrnium occidentale lucidum* Nelson.